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CLAIMS

1. Apparatus for producing attenuation corrected nuclear medicine images of patients, comprising:

at least one gamma camera head that acquires nuclear image data suitable to produce a nuclear tomographic image at a first controllable rotation rate about an axis;

at least one X-ray CT imager that acquires X-ray data suitable to produce an attenuation image for correction of the nuclear tomographic image at a second controllable rotation rate about the axis; and

a controller that controls the data acquisition and first and second rotation rates to selectively provide at least one of the following modes of operation:

(i) a movement gated NM imaging mode in which the second rotation rate is substantially higher than the first rotation rate and the data from each view of the X-ray acquisition is associated with one of a plurality of respiration gated time periods;

(ii) a cardiac gated NM imaging mode in which the second rotation rate is substantially higher than the first rotation rate and the data from each view of the X-ray acquisition for different rotations is averaged, wherein the X-ray data is not correlated with the cardiac cycle; and

(iii) a cardiac gated NM imaging mode in which the second rotation rate is higher than the first rotation rate and the X-ray data is binned in accordance with a same binning as the NM data.

2. Apparatus according to claim 1 wherein the controller controls the data acquisition and first and second rotation rates to provide at least two of the modes of operation.

3. Apparatus according to claim 1 wherein the controller controls the data acquisition and first and second rotation rates to provide all three of the modes of operation.

4. Apparatus according to claim 1 ~~or claim 2~~ wherein the provided modes of operation include at least mode (i).

5. Apparatus according to claim 1 ~~or claim 2~~ wherein the provided modes of operation include at least mode (ii).

6. Apparatus according to claim 1 ~~or claim 2~~ wherein the provided modes of operation include at least mode (iii).

7. A nuclear medicine camera having an X-ray imaging capability, comprising:

at least one gamma camera mounted on a gantry; and

an X-ray CT imager mounted on the same gantry,

wherein the at least one gamma camera and said X-ray imager are capable of simultaneously rotating about a common axis at different rotation rates.

8. A nuclear medicine camera according to claim 7 wherein the at least one gamma camera and said X-ray imager are capable of simultaneously rotating about a common axis at the same rotation rate.

~~9. A nuclear medicine camera having an X-ray imaging capability, comprising:~~

a gantry having a stationary portion and at least one rotating portion;

at least one gamma camera mounted on a said at least one rotating portion and capable of being rotated together at a common first rotation rate about an axis, said at least one gamma camera being capable of acquiring nuclear imaging data for reconstructing a tomographic nuclear image; and

an X-ray CT imager having an X-ray source mounted on said at least one rotating portion and being capable of acquiring X-ray imaging data for reconstructing an X-ray image;

said X-ray CT imager being mounted closer to said stationary portion than said at least one gamma camera.

10. A system according to claim 9 wherein the X-ray CT imager is mounted between the at least one gamma camera and stationary portion.

11. A system according to claim 9 wherein the at least one gamma camera comprises two gamma cameras.

30. A method according to claim 29 wherein the second axially extending portion is smaller than the first axially extending portion.

31. A method according to claim 29 ~~or claim 30~~ wherein determining an extent comprises acquiring a planar nuclear emission image.

32. A method according to claim 29 ~~or claim 30~~ wherein determining an extent comprises: determining said extent from said acquired nuclear emission data.

33. A method according to claim 29 ~~or claim 30~~ wherein the transmission data is acquired using an X-ray source.

34. A method according to claim 29 ~~or claim 30~~ wherein the transmission data is acquired using a gamma ray source.

35. A method according to claim 31 wherein the transmission data is acquired using an X-ray source.

36. A method according to claim 31 wherein the transmission data is acquired using a gamma ray source.

37. A method according to claim 32 wherein the transmission data is acquired using an X-ray source.

38. A method according to claim 32 wherein the transmission data is acquired using a gamma ray source.

39. A method according to claim 33 wherein the transmission data is acquired using an X-ray source.

40. A method according to claim 33 wherein the transmission data is acquired using a gamma ray source.

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41. A method of acquiring attenuation data for correcting a nuclear image, comprising:

determining an extent of an organ of interest in the body;

acquiring nuclear emission data over a first axially extending portion of the body larger than the organ of interest; and

acquiring transmission data over a second axially extending portion of the body, responsive to the determined extent of the organ, said second portion being substantially smaller than the first portion.

42. A method according to claim 41 wherein determining an extent comprises acquiring a planar X-ray image.

43. A method according to claim 41 ~~or claim 42~~ wherein the transmission data is acquired using an X-ray source.

44. A method according to claim 41 wherein determining an extent comprises acquiring a planar transmission gamma ray image.

45. A method according to claim 41 ~~or claim 44~~ wherein the transmission data is acquired using a gamma ray source.

46. A method according to claim 41 wherein determining an extent comprises acquiring a planar nuclear emission image.

47. A method according to claim 41 wherein determining an extent comprises:

determining said extent from said acquired nuclear emission data.

48. A method of producing a nuclear medicine image of a subject, comprising:

acquiring nuclear imaging data suitable to produce a nuclear tomographic image, said nuclear image data being acquired by a gamma camera head rotating about the subject;

acquiring X-ray imaging data suitable to produce an X-ray tomographic image for attenuation correction of the gamma camera image, said X-ray imaging data being acquired by detectors irradiated by an X-ray source rotating around the subject;

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acquiring X-ray imaging data suitable to produce an X-ray tomographic image for attenuation correction of the gamma camera image; and

circuitry capable of reconstructing an attenuation corrected nuclear medicine image utilizing the nuclear imaging data and X-ray imaging data, said C-T X-ray imager having a capability of producing a C-T image having an RMS noise level of only about 10 Hounsfield numbers or more.

53. Apparatus according to claim 52 wherein the RMS noise level is more than 15 Houndsfield numbers.

54. Apparatus according to claim 52 wherein the RMS noise level is more than 20 Houndsfield numbers.

55. Apparatus according to claim 52 wherein the RMS noise level is more than 50 Houndsfield numbers.

56. Apparatus according to claim 52 wherein the RMS noise level is more than 100 Houndsfield numbers.

57. Apparatus according to claim 52 wherein the RMS noise level is less than about 200 Houndsfield numbers.

CLAIM 52

58. Apparatus according to ~~any of claims 52-57~~ the X-ray imager is only capable of producing a tomographic image having a resolution poorer than about 2 lp/cm in a transaxial direction.

59. Apparatus according to claim 58 wherein the resolution is poorer than about 3 lp/cm.

60. A apparatus according to claim 58 wherein the resolution is poorer than about 4 lp/cm.

61. Apparatus for producing a nuclear medicine image of a subject, comprising:

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